

The Relevance of Sustainability Reporting and Assurance:

A Global Perspective

Abstract

This paper examines the factors and determinants of sustainability reporting and assurance (SRA) worldwide. We perform descriptive and regression analyses in determining the trends in quality and quantity of SRA and determinants of SRA using the Global Reporting Initiative database from 2005-2016. We find: (1) the quantity and quality of SRA have significantly increased worldwide in the past decade; (2) a positive association between the quality and quantity of SRA and sustainability disclosure, and the United Nations Sustainable Development Goals (SDGs); (3) sustainability reporting quantity and quality are significantly associated with legal, social, ethical and environmental factors. Our results provide insight to both factors and determinants of SRA, which shed light in identifying the nature and benefits of SRA in the voluntary disclosure literature. Our findings are relevant to current debates among global policymakers, regulators, standard-setters, the business community, and the accounting profession in improving the quantity and quality of SRA.

Keywords: Business Sustainability; Sustainability Reporting; Sustainability Assurance; Sustainability Disclosure; Corporate Social Responsibility.

JEL classification: M12; M14; M52

I. INTRODUCTION

Corporate disclosure, either mandatory or voluntary, provides investors and other stakeholders with reliable, relevant, useful, and transparent financial and non-financial information in making sound decisions. Global public companies are now facing the challenges of adapting proper sustainability strategies and practices to effectively respond to social, ethical, environmental, and governance issues while creating sustainable financial performance and value for their shareholders. Business sustainability enables corporations to disclose their financial economic sustainability performance (ESP) and non-financial environmental, social, and governance (ESG) sustainability performance information to all stakeholders, which is intended to improve the integrity and relevance of the corporate reporting process.¹ Anecdotal evidence suggests that investors value both ESP and ESG (EY 2017; IIRC, 2018) and scholarly research documents a positive relationship between them (Waddock and Graves, (1997; Ng and Rezaee, 2015; Rezaee and Tuo, 2017). Wallage (2000) states that “Sustainability reporting and verification are at a very early stage of development” and Simnett, Vanstraelen and Chua (2009) call for more research in sustainability reporting and assurance. Recently, Hummel, Schlick and Fifka (2019:733) claims that “research on sustainability assurance is still in its beginnings.” Motivated by recent anecdotal evidence promoting sustainability and academic studies suggesting the need for recent research on sustainability reporting and assurance, this study examines factors and determinants of sustainability reporting and assurance (SRA) worldwide.

¹ The terms corporate sustainability, corporate social responsibility (CSR), environmental, social, and governance (ESG), have been interchangeably used in the literature and authoritative reports. Rezaee (2015) defines five dimensions of sustainability performance as economic, governance, social, ethical and environmental (EGSEE). We define sustainability performance dimensions as ESP) and ESG with ethics being incorporated into both ESP and ESG dimensions of sustainability performance as specified in G4 of the GRI.

Business sustainability has become a strategic imperative for corporations in integrating financial ESP and non-financial ESG sustainability performance into their corporate culture and business models in creating shared value for all stakeholders (Rezaee, 2016 and 2017). Using the Global Reporting Initiative database on SRA from 2005-2016, we examine the quantity of SRA in terms of the number of SRA reports and the SRA quality in the context of type and assurance of the SRA reports. We construct four factors of SRA including sustainability reporting quantity (SRQ1), sustainability reporting quality (SRQ2), sustainability assurance quantity (SAQ1) and sustainability assurance quality (SAQ2). We also construct several determinants of SRA such as ESG sustainability performance disclosures, indices, ratings, and the use of the United Nations Sustainable Development Goals (SDGs). The sustainability factors are used as dependent variables and the sustainability determinants are explanatory variables, while financial attributes are used as control variables (total assets, ROA) in our regression model. We also investigate the association between SRA across industries as well as region.

Our univariate analyses show SRA factors have significantly enhanced worldwide in the past decade. We specifically find that: (1) the global trend in the issuance of sustainability reports has made substantial progress with a total of 40,026 sustainability reports in the past decade and a majority (about 70 percent) were published in the past five years; (2) the global trend in obtaining sustainability assurance has made steady progress in the past five years with a total of 7,177 assurance reports; (3) the top two continents in terms of numbers of sustainability reports issued, are: Europe with a total of 15,008 and Asia with 11,318 sustainability reports; (4) the top two continents in terms of percentage of sustainability assurance obtained are: Europe followed by Asia (42 and 30 percent respectively); (5) the majority of sustainability reporting and assurance are in financial services, energy, and food and beverage industries (a total of 26

percent); and (6) the quality of both sustainability reports and assurance has significantly improved worldwide in the past five years. Further analyses show that Asia with 2009 sustainability reports per capita and Africa with 1287 reports are ranked top sustainability reporting continents whereas Oceania and Europe sustainability reports are ranked higher for sustainability reports per population. The percentage of sustainability assurance statements per sustainability reports are almost evenly spread among continents with Europe of highest 30 percent and Asia, Latin America and Africa of 26 percent.

Our multivariate regression analyses indicate that several sustainability determinants of performance disclosure and ESG scores are associated with the four factors of SRA. Several of the UNSDGs goals such as quality education, gender equality, quality of life on land, responsible consumption and production as proxies for social and ethical attributes, clean water and sanitation as a proxy for environmental attributes and peace and justice as a proxy for the legal system are also linked to four SRA factors. Sustainability reporting quantity and quality are significantly associated with ESG scores and social and ethical activities. Sustainability assurance quantity and quality are significantly associated with the legal system and social and environmental factors. Our results also indicate that sustainability reporting quantity and quality are linked to Europe whereas sustainability assurance quality and quantity are related to North America. The results show that SRA is significantly associated with the four industries of financial, material, telecommunication services, and utilities.

We contribute to the emerging sustainability literature in several ways. First, our findings are relevant to current debates among global policymakers, regulators, standard-setters, the business community, and the accounting profession in improving the quantity and quality of SRA by standardizing reporting on ESG sustainability information. Global accounting standard-

setters such as the Financial Accounting Standards Board (FASB) and International Accounting Standards Board (IASB), are currently debating whether and how to establish accounting guidelines for the proper recognition and disclosure of CSR/ESG sustainability information (Barker & Eccles, 2018) and thus our results should be relevant in establishing such standards. Second, our results support current initiatives that have been taken by global regulators and stock exchanges (Global Reporting Initiative, GRI, 2014 International Integrated Reporting Council, IIRC, 2014 and 15; HKEx 2015; European Commission 2014) in promoting integrated sustainability reporting and assurance. Given the substantial variations in sustainability reporting and assurance practices across firms, especially across firms from different countries internationally, the results presented in this paper offer insight into the standardization of such practices.

Third, our paper attempts to untangle whether an increased quality and quantity of SRA are value relevant to companies and their investors by linking SRA factors to SRA determinants. Finally, our study contributes to the literature on corporate social responsibility (CSR) and emerging research in sustainability performance and disclosure. Our results provide insight to both factors and determinants of SRA, which shed light in identifying the nature and benefits of SRA in the highly controversial voluntary disclosure literature.

The remainder of this paper is organized as follows: section II, presents institutional background and literature review, section III illustrates the theoretical framework and research questions, section IV analyzes the factors and determinants of sustainability reporting and assurance worldwide, and section IV concludes the paper.

II. INSTITUTIONAL BACKGROUND AND LITERATURE REVIEW

II.1 Institutional Background

In the aftermath of financial scandals (e.g., Enron, WorldCom) at the turn of the 21st century and the 2007-2009 global financial crisis, public companies have become more sensitive towards disclosing their ethical value, long-term sustainability performance, reporting integrity, and reputation (Rezaee, 2016). More than 6,000 European companies are now required to disclose ESG sustainability performance information in their 2017 financial reports and onwards (EU, 2014). In recent years, the global regulators have mandated, investors have demanded, and corporations have disclosed information on their ESG sustainability performance (Rezaee, 2016 and 2017).

Business sustainability has recently evolved from focusing on the short-term financial performance and fulfillment of CSR to the achievement of long-term financial performance and ESG sustainability performance in creating shared value for all stakeholders. Brockett and Rezaee (2012) and Rezaee (2015) discuss the multiple dimensions of business sustainability as economic, governance, social, ethical, and environmental performance (EGSEE). Recently, more than 40,000 public companies worldwide have issued sustainability reports on a voluntary basis on various dimensions of sustainability performance (Global Reporting Initiative, GRI, 2016). In May of 2013 the GRI unveiled its G4 Guidelines, which promote sustainability reporting as the standard practice of disclosing sustainability performance dimensions relevant to companies' business and their stakeholders (GRI, 2013). The G4 Guidelines present Reporting Principles, Standard Disclosures, and an Implementation Manual for sustainability reporting on economic,

governance, social, and environmental sustainability performance with ethics being integrated into other dimensions of sustainability performance (GRI, 2013).

The International Integrated Reporting Council promotes a comprehensive framework for integrated sustainability reports, which integrates financial ESP with non-financial ESG sustainability performance enabling greater organizational transparency and more relevant information for all stakeholders (IIRC 2014). The IIRC's framework addresses the fundamental concepts of integrated reporting by improving the quality and quantity of financial and non-financial sustainability information disclosed by business organizations (IIRC, 2014).

The Sustainability Accounting Standards Board (SASB) establishes sustainability accounting standards in providing guidelines for the material disclosure of sustainability performance for 88 industries in 10 sectors as part of mandatory filings with the SEC (SASB 2013). The SASB released its Sustainability Conceptual Framework consisting of objectives, key definitions, and characteristics of sustainability accounting and disclosures, methodology for assessing the materiality of sustainability issues, and structure and harmonization of sustainability accounting standards (SASB, 2013). The integration of SASB standards with existing SEC disclosure rules avoids additional costs for companies in disclosing relevant, useful and material financial and non-financial disclosures.

In recent years, global public companies have provided information on their financial ESP and non-financial ESG sustainability performance with ethics performance being integrated into ESP and ESG sustainability performance. Disclosure of ESP information is mandatory whereas ESG information is typically disclosed on a voluntary basis worldwide (Junior, Best and Cotter, 2014). The report of the Investor Responsibility Research Center Institute (IRRCi) indicates that investors and portfolio managers are integrating ESG information into their

investment decisions (IRRCi, 2018). The United Nations has recently taken several initiatives including the Sustainability Development Goals (SDGs) and the Principles for Responsible Investment (PRI) in encouraging investors to use ESG factors in their investment decisions (IRRCi, 2018). Despite the importance of ESG sustainability performance reporting to business organizations and investors, concerns have been raised about the greenwashing aspect of sustainability reporting and assurance (Rezaee, 2017). However, regulators underscore the importance SRA as highlighted by the former Chairperson Mary Jo White that, “to the extent issues about sustainability are material to a company’s financial condition or results of operations, they must be disclosed” (Securities and Exchange Commission, SEC, 2016). The SEC is currently considering ESG disclosure as part of its non-GAAP disclosure initiatives and it is expected that SRA will receive more attentions from regulators in the United States as the business and investment communities request the SEC to issue rules on ESG disclosure (Williams and Fisch, 2018).

II.2 Literature Review

Prior research shows that voluntary disclosure can improve stock liquidity, reduce the cost of capital, increase information intermediation, and improve earnings quality (e.g., Rezaee, 2016). The extent and type of voluntary disclosures depend on disclosure-related costs (Zhang, 2001), corporate governance (Ho and Wong, 2001), executives’ personal backgrounds (Bamber et al., 2010), and sustainability performance (Ng and Rezaee, 2015; Khan et al., 2016). Ball and Shivakumar (2008) argue that mandatory financial reports are not the primary source of timely new information, and Beyer et al. (2010) find that mandatory earnings reports and SEC filings account for less than 12 percent of total stock price movement. Anecdotal evidence suggests that investors value meaningful voluntary disclosures and utilize mandatory disclosures to verify the

voluntary disclosures (EY 2014). Scholarly research also supports the importance of the relation between mandatory and voluntary disclosures (Bertomeu and Magee, 2015; Rezaee and Tuo, 2017).

Prior studies (e.g., Lopez et al., 2007; Golicic and Smith, 2013; Eccles et al., 2014; Ng and Rezaee, 2015) report a positive association between non-financial sustainability performance and financial performance and their integrated effect on cost of equity. Hummel and Schlick (2016) find that firms with superior sustainability performance choose high-quality sustainability disclosures to signal their superior sustainability performance in compliance with signaling/voluntary disclosure theory. Firms with poor sustainability performance, prefer low-quality sustainability disclosure to protect their legitimacy consistent with legitimacy theory. Recent research (Lys et al., 2015; Jain et al., 2016) documents that firms may commit to good CSR and disclose such information in the current period when they anticipate stronger future financial performance.

Prior research also finds the association between individual components of sustainability disclosures (environmental, social, and governance) and financial and market information (e.g., Dhaliwal et al., 2011; Dhaliwal et al., 2012; Clarkson et al., 2008; Ng and Rezaee, 2015; Jain et al., 2016). Furthermore, there is abundant evidence of the link between ESG sustainability and long-term financial stability and success (ICGN, 2016; Unruh et al., 2016). Investors also value ESG information as more than 75 percent of institutional investors take ESG sustainability into account in their investment decisions and expect management to focus on the achievement of long-term sustainable financial performance (CFA Institute, 2015). Despite recent anecdotal and empirical evidence suggesting the importance of business sustainability, research on sustainability reporting and assurance is rare. The relevant literature (e.g., Wallage, 2000;

Simnett et al., 2009) is dated, by ten plus years, with the explosion of sustainability reporting and assurance that has occurred in recent years. Thus, this paper is intended to address this gap in the literature.

A survey conducted by KPMG in 2017 shows that more than 78 percent of the S&P 500 companies issued an integrated sustainability reports whereas a higher number of the world's largest companies (93%) released sustainability reports in 2017. The 2018 study of Sustainable Investment Institute (Si2) and the IRRC Institute states that about 78 percent of the S&P 500 companies issued integrated sustainability reports in 2018, only about 36 percent of the issued sustainability reports were assured by external assurance providers (IRRCi, 2018). These surveys provide anecdotal evidence about the status of sustainability reporting. Our study, while confirming the move toward sustainability reporting and assurance as stated in the prior studies and surveys, examine the factors and determinants of sustainability reporting and assurance worldwide. Hummel et al. (2019) find a negative association between sustainability performance and both assurance process depth and breadth (extent and types of assurance statements).

III. THEORETICAL FRAMEWORK AND RESEACH QUESTIONS

III.1 Theoretical Framework

Theoretically, companies that effectively manage their business sustainability by improving ESG performance, conduct their business more effectively and ethically, enhance their reputation, fulfill their social responsibility, and their environmental commitments can also contribute to their bottom line financial performance. Rezaee (2016 and 2017) discusses several sustainability theories of agency/shareholder, stakeholder, signaling, legitimacy and stewardship in explaining the integrated and interrelated dimensions of sustainability performance and their

relevance to firm value creation. These theories suggest that companies should focus on key measures of sustainable performance such as operational efficiency, supply chain management, customer satisfaction, talent management, and innovation, climate change, and social and environmental issues.

Taken together, all of the theories above have implications for business sustainability in the sense that firms should realize that their main objective function is to create shareholder value in compliance with agency/shareholder theory while protecting the interests of other stakeholders under the stakeholder theory, contributing to society, the environment and human needs in accordance with the institutional theory, securing their legitimacy under the legitimacy theory, differentiating themselves from low sustainability firms through the disclosure/signaling theory and considering all capitals including financial, physical, human, social and environmental under stewardship theory.

The emerging business sustainability requires management to simultaneously consider divergent economic, governance, social, ethical and environmental issues. Stewardship theory enables management to effectively exercise stewardship over a broader range of financial and non-financial assets and capitals including financial, physical, human, social and environmental capitals. Stewardship among other theories enable firms and their management to translate ESG sustainability performance to financial performance and thus creating firm value. The relationships between business, society, and the environment are complex and often tense, and management must find ways to address the potential tension and maximize both financial and ESG sustainability performance. However, a single, cohesive, and integrated theory of business sustainability is lacking in explaining the multidimensional and apparently conflicting aspects of sustainability performance. Regardless of which theory is more relevant to a particular firm or

perhaps which integrated theories can be more effective, management should effectively address CSR, corporate governance effectiveness, climate change and other environmental challenges.

III.2 Research Questions

Traditional financial statements, providing historical financial information concerning an entity's financial condition and results of operations as a proxy for future business performance, may be lacking in relevant information. Public companies are being criticized for primarily focusing on profit maximization and thus shareholder value creation while paying minimal attention to the impacts of their operations on society and the environment (Porter and Kramer, 2011). As corporate sustainability is gaining more attention and being integrated into the business culture and model, there has been a shift from the creation of shareholder value to the development of "sustainable shared value creation" to protect the interests of all stakeholders (Porter and Kramer, 2011). Under the shared value creation concept, management focuses on the continuous performance improvement of business operations in generating long-term value while maximizing the positive impacts of operations on society and the environment by measuring sustainable performance in terms of both ESP and ESG sustainability performance. Thus, corporate objectives have advanced from profit maximization to increasing shareholder wealth and now to creating shared value for all stakeholders.

The move towards sustainability requires management to integrate both ESP and ESG sustainability performance into corporate culture, business environments, and strategic decisions as well measuring and reporting sustainability performance. The format and content of integrated sustainability performance reporting is evolving rapidly. Although guidelines of sustainability reporting (e.g., GRI, IIRC, SASB) are helpful, currently there is no single taxonomy that can

address the ESP and ESG dimensions of sustainability performance. The 2018 study of the IRRC Institute indicates that the majority of reporting companies (97%) chose to customize their sustainability reports in terms of the style, format, and content instead of following the existing framework (GRI, SASB) (IRRCi, 2018). This paper addresses the following research questions: (1) What is the global trend in terms of quantity in voluntary SRA in the past decade? (2) Has the quality of SRA improved worldwide in the past decade? and (3) What are the determinants of the increasing trends in SRA?

IV. RESEARCH DESIGN

IV.1 Sustainability Reporting and Assurance Factors

The Global Reporting Initiative (GRI) was launched in 1997 to bring consistency and global standardization to sustainability reporting. The GRI database provides sustainability reporting and assurance information for companies across 6 regions around the world (Europe, Northern America, Asia, Latin America and the Caribbean, Africa, and Oceania).² We use the GRI database to provide a snapshot of current global trends (quantity) in sustainability reporting practices for a sample of 40,026 companies worldwide over the 2005-2016 period and sustainability assurance practices for 7,177 companies across 6 regions worldwide for the period of 2012-2016 (GRI, 2016). Consistent with Rezaee and Tuo (2017), we construct two variables for sustainability reporting quantity and quality as well as the two variables of sustainability assurance quality and quantity. Sustainability reporting quantity (SRQ1) is determined based on

² The GRI Framework includes guidelines initially on G1, G2, G3, G3.1 and finally G4 and other resources that assist business organizations with creating a systematic report of their ESP and ESG sustainability performance. The earlier guidelines (G1 and G2) cover ESG sustainability whereas the latest guidelines (G4) address both ESP and ESG dimensions of sustainability performance with ethics integrated into all sustainability performance dimensions.

whether the firm issues sustainability reports and sustainability reporting quality (SRQ2) indicates how the firm uses the GRI guidelines in the preparation sustainability reports. The sustainability assurance quantity (SAQ1) is determined by whether the firm obtains either external or internal assurance on its sustainability report whereas sustainability assurance quality (SAQ2) indicates whether the assurance is provided by internal or external assurance providers and whether the type of assurance is classified as either limited or reasonable assurance.

IV.2 Determinants of Sustainability Reporting and Assurance

Prior studies suggest several determinants of sustainability reporting and assurance (SRA) including stakeholder orientation and CSR/ESG initiatives (Rezaee 2016 and 2017), legal environment (Simnett et al., 2009), and financial attributes (Casey and Grenier, 2015; Simnett et al., 2009). These studies find that sustainability reporting and assurance reflect the interaction between a firm's financial, social, environmental and governance performance (Rezaee, 2016). Thus, we examine the relationship between the four factors of SRA (SRQ1, SRQ2, SAQ1, SAQ2) and several determinants of sustainability including sustainability disclosure, sustainability index, sustainability ratings, and several goals of SDGs after controlling for financial attributes of size and returns.

Our research question of whether there is a relationship between SAR factors and sustainability determinants is addressed by estimating the following equation:

$$SRA\ Factors = \alpha_0 + \sum \beta_i \cdot Explanatory + \sum \beta_i \cdot Control_i + \Sigma Industry + \Sigma Region + \Sigma Year + \varepsilon \quad (1)$$

SRA factors are either SRQ1 or SRQ2, SAQ1, SAQ2. All dependent, explanatory and control variables are defined in the Appendix. SRA factors take the value of 1 in the case of the presence of SRQ1, SRQ2, SAQ1 or SAQ2, and 0 otherwise. In addition, we include both year and industry fixed effects in the regression and cluster the standard errors at the firm level.

V. DATA AND SAMPLE

V.1 Sample Selection

To construct our sample, we use the GRI database for ten years (2005-2016) to compile data regarding the sustainability reporting quality and quantity and five years of (2012-2016) sustainability assurance quality and quantity (GRI, 2016). Following Barth et al. (2012), we first select the firms which disclose at least one sustainability report according to the GRI database. For our trend analyses, the selected sample consist of 40,026 companies worldwide over the 2005-2016 and sustainability assurance practices for 7,177 companies across 6 regions worldwide for the period of 2012-2016.³ The sample size for our regression analyses consist of a total of 4,674 firm-year observation between 2012 and 2016, which is evenly distributed among years and industries.

V.2 Variables Construction

All the dependent, explanatory and control variables used in equation 1 are constructed as specified in the following sub-sections.

³ We use the 2012-2016 period for sustainability assurance because The GRI issued the G4 Guideline for sustainability report preparers in 2012 and encourages firms to generate more reliable and relevant sustainability information by obtaining assurance on sustainability reports.

V.2.1 Dependent Variables

Dependent variables are the four factors of SRA as sustainability reporting quantity (SRQ1), sustainability reporting quality (SRQ2), sustainability assurance quantity (SAQ1) and sustainability assurance quality (SRQ2). The GRI database provides whether the sustainability reports follow the GRI framework and classifies the sustainability reports into seven ranks, including following G1, following G2, following G3, following G3.1, following G4, following GRI only referenced, and non-following GRI. Our first dependent variable is (SRQ1), which determines whether the firms release sustainability reports following GRI Framework G1, G2, G3, G3.1 or G4. The second dependent variable is SRQ2, which reflects types of the report based on the GRI categories and determines how disclosing firms apply GRI frameworks in preparing their sustainability reports. GRI classifies the sustainability reports' application level of GRI frameworks into several ranks. We give corresponding scores to each firm based on their application level. We respectively give a score of 1 to 9 to each firm with application level as "Undeclared", "Reference Only", "In Accordance" or "In accordance – Core", "Content Index Only", "C", "C+", "B", "B+", "A" and "A+". Higher scores indicate a better application level of GRI framework and thus better disclosure quality (SRQ2). The third dependent variable is SAQ1, which is the number of sustainability assurance reports in each continent. The last dependent variable is SAQ2, which measures whether the sustainability reports are accompanied by external assurance and whether sustainability reports are assured by accounting firms to proxy the disclosure quality.

V.2.2 Explanatory Variables

Our main explanatory variables are selected from the 17 Sustainable Development Goals (SDGs) build on the United Nations Millennium Development Goals of 2000-2015, and involve new areas such as climate change, economic inequality, innovation, sustainable production and consumption, and peace and justice (UNSDG, 2015). These SDGs are relevant to the three dimensions of sustainability development, economic development, and social and environmental development and thus can be linked to ESP and ESG sustainability performance. SDGs are supported by 169 targets and 232 indicators and aligned with GRI G4 performance indicators (GRI, 2017). Corporations frequently use these goals and link them to both ESP and ESG sustainability performance from the sourcing of raw materials and inputs for production to product innovations that lead to positive environmental, health, or societal impacts. Many of these 17 SDGs are relevant to business sustainability performance, reporting and assurance and are important in accounting research (Bebbington and Unerman, 2018). For example, SDG 6 is a proxy for clean water and sanitation, a combination of SDGs 5, 10 and 16 focusing on human rights and equalities, SDG 13 is related to climate action, and SDGs 14 and 15 are applicable to the nature of the life below the water and the life on land.

The SDGs are related to sustainability reporting and assurance as they address economic, social, ecological sustainability outcomes. Bebbington and Unrman (2018) suggest that future accounting research uses SDGs in assessing the role of these goals in creating opportunities for research in sustainability. In November 2016, the International Federation of Accounting (IFAC) published a policy document that considers many of the 17 SDGs relevant to the accounting profession including those that address quality education, gender equality, economic growth, innovation, production, climate action and societal issues (IFAC, 2016). The 2017 report of

PricewaterhouseCoopers (PwC, 2017) suggests that a majority of global firms (over 62 percent) mentioned many of the SDGs in their reporting. Following the SDGs and IFAC (2016)), we use the SDG Index for each of the 17 SDGs using indicators that offer data for at least 80 percent of all countries with a population greater than 1 million. For each country we then create an indicator score that ranges between the worst (0) and best (100) cases.

We use two other explanatory variables of the Dow Jones Sustainability Indices (DJSI) and the Thomson Reuters ESG Score. These two sustainability indices are selected as proxies for a firm's reputation for, and commitment to sustainability. DJSI evaluates more than 2,500 of the world's largest public companies based on economic, environmental, and social factors. We collect data on the membership of DJSI from DJSI's official website and construct an indicator variable that equals 1 if a firm is included in the DJSI in a given year and 0 otherwise. We construct the ESG score from the Thomson Reuters ASSET4 database, which collects information on environmental, social and governance (ESG) metrics. ASSET4 provides objective and verifiable ESG data with comprehensive global coverage. The ESG sustainability disclosure component scores range from 0.1 for companies that disclose the minimum amount of ESG data to 100 for those that disclose every data variable collected by Thomson Reuters.

V.2.3 Control Variables

Consistent with prior research (Casey and Grenier, 2015; Simnett et al., 2009) we include two control variables of size and profitability. First Total Assets (SIZE) is the natural logarithm of a firm's total assets. Profitability is measured by return on assets (ROA), which is an indicator of how profitable a company is relative to its total assets.

VI. RESULTS

VI.1 Univariate Analyses of Sustainability Reporting and Assurance Factors

We start our analysis by examining the factors of sustainability reporting and assurance for our initial sample as reported in this section under sustainability reporting quantity and quality as well sustainability assurance quality and quantity.

VI.1.1 Sustainability Reporting Quantity

Sustainability reporting reflects both financial ESP and non-financial ESG sustainability performance. Panel A of Table 1 shows that total sustainability reports worldwide have significantly increased from 438 reports in 2005 to 6,526 reports in 2016 with an increase of about 15 times. This trend is expected to continue as regulators worldwide are now moving towards mandatory sustainability reporting. The top two continents with the highest sustainability reporting are Europe and Asia with a total of 15,008 (37 percent of total 40,026 reports) and 111,318 (28 percent) respectively. The next two continents are Latin America and North America with a total of 5,093 (13 percent) and 4,722 (12 percent) sustainability reports respectively. The two continents with lowest sustainability reports are Africa and Oceania with 2,328 (6 percent) and 1,557 (4 percent) respectively. These results reveal that European companies following by Asian companies having the highest percentage of sustainability reporting over the ten years and Oceania had the lowest rate of reporting over the last ten years. This suggests that regulators in both Europe and Asia have been effective in promoting sustainability reporting and assurance. Asia and Africa exhibit highest sustainability reports per GDP per capita (2009, 1287) whereas Oceania and Europe (41, 20) show highest sustainability per population respectively.

Panel B of Table 1 reveals that sustainability reports are issued by companies in many industries from Chemical to energy, financial services, real estate, mining, and technology. The top three industries for sustainability reports represented by 12 years are financial services with 5,026 reports (13 percent of total reports), energy with 2,638 reports (7 percent) and food and beverage 2,402 reports (6 percent). All industries show increasing trend in issuing sustainability reports in the past decade with financial services showing more impressive progress towards sustainability reporting from 66 reports in 2005 to 844 reports in 2016 whereas Real Estate went from 2 reports in 2005 to 224 in 2016. These results are not consistent with those of Casey and Grenier (2015) indicating that finance and utilities firms in the United States are not more likely to obtain CSR assurance.

[Insert Table 1 Here]

VI.1.1.2 Sustainability Reporting Quality

Several global professional organizations, including the GRI, IIRC and the SASB have developed a set of globally accepted, uniform, and standardized sustainability reporting guidelines. These organizations in general, and the GRI in particular, address the quality of sustainability reporting. Table 2 shows the quality of sustainability reporting based on compliance with G4 of the GRI classifications from 2005-2016. There is an increasing improvement in the quality of sustainability reports in the sense that the majority (85 percent) of sustainability reports were issued in accordance with either GRI Core or comprehensive guidelines. The GRI, in its 2013 G4 guidelines, encouraging the preparation of sustainability reports in compliance with either “Core” or “Comprehensive” will enable companies to improve the quality of their sustainability reports to distinguish themselves from the majority of “Undeclared” to the highest level of incompliance with G4. The top three different levels of the

GRI application used by global companies are 5,320 (21 percent) In Accordance –Core: followed by “Undeclared indicators” (20 percent) and by “A+” and “B” application 3,402 (13 percent).

[Insert Table 2 Here]

VI.1.2 Sustainability Assurance

The credibility, objectivity, and reliability of sustainability reports can be improved by providing assurance on such reports and thus the demand for sustainability assurance reports is expected to increase (Rezaee, 2015 and 2016). Users of sustainability reports should value the assurance provided by external third parties intended to lend more credibility to financial ESP and non-financial ESG sustainability performance information disclosed by companies.

VI.1.2.1 Sustainability Assurance Quantity

Firms that desire to improve the credibility of their sustainability reports may choose to obtain assurance on these reports from internal or external assurance providers. Panel A of Table 3 indicates that sustainability assurance has made steady progress after the issuance of G4 and in the past five years a total of 7,177 sustainability assurance reports worldwide were issued in the 2012-2016 period. Table 3 shows the trend in sustainability assurance opinions in the past five years for companies in all six reported continents. The top two continents for sustainability assurance represented for almost five years are Europe with 3,042 statements (42 percent) and Asia with 2,162 statements (30 percent). Companies in Latin America reported 957 (14 percent) assurance statements followed by companies in North America (7 percent) and other continents with less than five percent. The last column of Panel A of Table 3 presents the sustainability assurance quantity as the percentage of the number of sustainability reports in each continent.

Europe shows the highest percentage (30%) followed by Asia, Latin America, and Africa (26%). The increasing trend in the issuance of sustainability assurance reports is shown for Asia whereas this trend in other continents has been steady from 2012 to 2016.

VI.1.2.2 Sustainability Assurance Quality.

Sustainability assurance either reasonable or limited can be provided internally by internal auditors, external assurance providers, or external auditors (Brockett and Rezaee, 2012; Rezaee, 2015). A reasonable assurance provides a positive opinion on whether the subject matter (ESP and ESG dimensions) of sustainability performance is, in all material respects, appropriately stated. A limited assurance provides a “negative opinion”, in which the assurance provider states that nothing has come to their attention to cause them to believe that the subject matter (sustainability report) is not, in all material aspects, appropriately stated. In general, assurance reports provided by external auditors and particularly those with reasonable assurance are perceived to be of higher quality compared with those provided by others and with a limited assurance (Rezaee, 2015). Panel B of Table 3 shows that much of opinions expressed in sustainability assurance reports (over 57 percent) are limited/moderate, suggesting that assurance providers opine that they are not aware of their client company failing to be in compliance with applicable sustainability guidelines (G4 of GRI). Over 31 percent did not specify what type of assurance was provided with their sustainability reports. Approximately nine percent of assurance reports are accompanied with reasonable /high level assurance suggesting that assurance providers opine on whether their client company is in compliance with applicable sustainability guidelines (e.g., G4 of GRI) whereas about three percent were a combination of limited and reasonable type of assurance.

Taken together, our results indicate that the trend towards sustainability reporting and assurance worldwide is increasing and there has been substantial progress in both the quantity and quality of sustainability reporting and assurance in several continents over recent years. These results suggest that despite the steady progress towards sustainability reporting and assurance, the quality and quantity of these reports can be significantly enhanced by the move towards mandatory sustainability reporting and assurance. Our results also show that the financial services industry provides the most sustainability reporting.

[Insert Table 3 Here]

VI.2 Multivariate Regression Results: Determinants of Sustainability Reporting and Assurance

VI.2.1 Descriptive Statistics

Table 4, Panel A presents the descriptive statistics of all variables used in our regression analyses. To reduce the impact of outliers, we winsorize all continuous variables at 1 percent and 99 percent. Panel A presents the mean, median, Q1 and Q3, and standard deviation of all variables used in the regression analyses for the 4,675 firm-years in our sample. For our dependent variables SRQ1, SRQ2, SAQ1, and SAQ2, the mean (median) is .87 (1), 2.99 (2), .39 (0) and .52 (0) respectively. Panel B of Table 4 shows the Spearman's correlations matrix for all variables. We test for multicollinearity and find no variance inflation factor in greater than 10, suggesting that there is no indication of multicollinearity that would affect our inferences. The results in Table 4 indicate that SRQ1, SRQ2 and SAQ1 are highly correlated with DJSI and several SDGs (4, 5, 6, 15 and 16). Furthermore, SAQ2 and SDGs 4, 5, 6, 13, 15, 16, and 17 are correlated. The signs and significance levels of the correlations between SRA dimensions and control variables are largely consistent with the results presented in prior research.

[Insert Table 4 Here]

VI.2.2 Regression Results

A summary of the OLS regression relation between the dependent variable of SRA factors and explanatory variables of ESG Score, DJSI, SDGs and control variables of Total Assets and ROA is presented in Table 5, with R-squared in the models for SRQ1, SRQ2, SAQ1 and SAQ2 being 0.0482, 0.1198, 0.1343 and 0.1198 respectively. Results suggest that all SAR factors (SRQ1, SRQ2, SAQ1 and SAQ2) as proxies for sustainability disclosures are highly associated with ESG Score as a proxy for sustainability performance. These results are consistent with those of Ng and Rezaee (2015) and Jain et al. (2016) that suggest a positive and significant relationship between sustainability performance and disclosures. None of the SRA sustainability factors are associated with the DJSI sustainability ratings. Our results also indicate that SRA factors are significantly associated with several SDGs including SDG 4 (quality education), and SDG 5 (gender equality) reflecting social attributes, which is deeply embedded in GRI standards. The results also indicate that SRQ1 and SRQ2 are significantly associated with SDG 15 (life on land) captures for social attributes. SAQ1 and SAQ2 are significantly associated with environmental attributes including SDG 6 (clean water and sanitation); SDG 12 (responsible consumption and production) and social attributes including SDG 16 (peace and justice) captures a legal environment. These results are consistent with those of Simnett et al. (2009) that indicate a stronger legal system relevant to environmental and social goals leads to the decision to assure better quality for SRA.

[Insert Table 5 Here]

The results of the OLS regression models for the relation between SRA and region are presented in Table 6, with R-squared in the models for SRQ1, SRQ2, SAQ1 and SAQ2 being 0.0152, 0.0330, 0.0361 and 0.0187. In summary, the results indicate that both sustainability reporting quality and quantity (SRQ1 and SRQ2) are significantly associated with Europe and North America whereas sustainability reporting quantity (SAQ1) is related to Northern America and Oceania and sustainability reporting quality (SAQ2) is linked to Asia and Latin America. Sustainability assurance quantity and quality (SAQ1 and SAQ2) are significantly associated with North America. One possible explanation is that European companies have been encouraged to disclose their ESG sustainability performance in the past decades and they are currently, as of 2017, required to disclose such information. An explanation for the higher quantity and quality of sustainability assurance is that the accounting profession in North America has been more actively involved in issuing guidelines for attestation and assurance services in the past decade.

[Insert Table 6 Here]

Results of the OLS regression models for the relation between SRA and industries are presented in Table 7, with R-squared in the models for SRQ1, SRQ2, SAQ1 and SAQ2 being 0.0126, 0.0228, 0.0306 and 0.0175. In summary, the results indicate that SRA is significantly associated with 4 industries namely: (1) Financial; (2) Material; (3) Telecommunication Services and (4) Utilities. In addition, the quantity and quality of sustainability reporting and assurance are significantly associated with energy, industrials, Information Technology, and Real Estate. Our results show an association between the environmental and societal risks and the level of sustainability disclosure. However, sustainability assurance quantity is significantly associated with the energy and healthcare industries. Results suggest that companies in energy, information

technology and mineral industries have more incentives to disclose their sustainability performance to signal their commitments to sustainability issues.

[Insert Table 7 Here]

In summary, our results indicate that companies that have better a legal environment and responsible consumption and production and social attributes, as determined by the UN SDGs, are more likely to disclose their sustainability reporting and assurance and obtain sustainability assurance to increase the credibility of reports and consequently enhance their corporate reputation. Additionally, our results indicate that companies with the highest ESG score and higher level of total asset are more likely to disclose SRA. Overall, sustainability assurance quantity and quality models using the SAQ have significantly greater explanatory capability than sustainability reporting quantity and quality models using the SRQ. The reason may be that other variables have a strong and controlling effect over the sustainability reporting quantity and quality, such as the use of external assurance.

VI. CONCLUSION

Global financial crises and scandals at the turn of the 21st century have eroded public confidence in the integrity of corporate activities and reliability and relevance of corporate disclosures. The true measure of success for corporations should be determined not only by their reported earnings, but also by their governance, social responsibility, ethical behavior, and environmental initiatives as reflected in integrated sustainability reports. An increasing number of companies worldwide are issuing integrated SRA. This paper examines the trends and determinants of SRA in the past decade by investigating the quantity and quality of SRA worldwide. We construct four measures of SRA factors as sustainability reporting quantity

(SRQ1), sustainability reporting quality (SRQ2), sustainability assurance quantity (SAQ1) and sustainability assurance quality (SRQ2). Measures of determinants of SRA are sustainability disclosures, sustainability ESG scores, the Dow Jones Sustainability Index (DJSI) and several goals of the UNSDGs including social benefits, environmental and ethical factors and legal system.

We find that the quantity and quality of SRA have significantly increased worldwide in the past decade. Our regression results indicate that several variables namely ESG sustainability performance score, and social, educational and environmental attributes and total assets are significantly associated with both SRQ1 and SRQ2. On the other hand, the several variables are significantly associated with the SAQ1 and SAQ2 including ESG scores, and UN SDGs such as gender equality, clean water and sanitation, responsible consumption and production and social attributes and total assets. This paper provides policy, practical, and research implications by presenting the status and determinants of sustainability reporting and assurance worldwide that can be used as a benchmark for standard-setters (GRI, IIRC, and SASB), business organizations, and researchers in other countries in promoting sustainability performance, reporting, and assurance. Overall, our results suggest that the quality and quantity of SRA have significantly increased and thus generated benefits to firms issuing SRA.

There are several caveats to this study. First, we use the GRI database in our analyses and thus the credibility and reliability of the GRI data are influenced by 'awareness' of GRI regarding who prepares sustainability reports and the assurance that the database is unbiased and comprehensive. Second, we count the number of reports in determining the quantity of the sustainability reports worldwide regardless of whether the economies in some of these continents in the sample have experienced significant growth in the period examined. It is possible that the

number of sustainability reports has increased, despite the market growth in some continents.

Third, we collect sustainability reporting and assurance quantity and quality from the GRI database and thus our results are affected by the data availability of the most recent years.

Finally, the selected variables as proxies for the determinants of SRA are collected from the UN sustainability development goals that are evolving and are not all inclusive.

REFERENCES

- Barker, R & Eccles, R. (2018). Should FASB and IASB be responsible for setting standards for nonfinancial information? December 2018, Available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3272250
- Barth, M. E., W. R. Landsman, M. H. Lang, and C. D. Williams. (2012). Are IFRS-based and US GAAP-based accounting amounts comparable? *Journal of Accounting and Economics*, Vol.54 (1), 68-93.
- Bebbington, J. and J. Unerman. (2018) "Achieving the United Nations Sustainable Development Goals: An enabling role for accounting research", *Accounting, Auditing & Accountability Journal*, Vol.31, Issue 1: 2-24.
- Ball, R., Shivakumar, L. (2008). How much new information is there in earnings? *Journal of Accounting Research*, 46(5), 975–1016.
- Bamber, L. S, J. Jiang and I. Y Wang. 2010. What's my style? The influence of top managers on voluntary corporate financial disclosure. *The Accounting Review*. Vol. 85, No.4:1131-1162
- Bertomeu, J., and Magee, R. P. (2015). Mandatory disclosure and asymmetry in financial reporting. *Journal of Accounting and Economics*, 59(2-3), 284-299.
- Beyer, A., Cohen, D. A., Lys, T. Z., Walther, B.R. (2010). The financial reporting environment: Review of the recent literature. *Journal of Accounting and Economics*, 50 (2-3), 296-343.
- Brockett, A., and Z. Rezaee. 2012. *Corporate Sustainability: Integrating Performance and Reporting*, John Wiley & Sons, Inc, Hoboken, NJ.
- Casey, R. J and J. H. Grenier. (2015). Understanding and contributing to the enigma of corporate social responsibility (CSR) assurance in the United States. *Auditing: A Journal of Practice & Theory*. (February 2015), Vol.34, No.1: 97-130.
- CFA Institute. 2015. Environmental, social and governance (ESG) survey. June 2015. Available at <http://irrcinstitute.org/pdf/FINAL-CFA-ESG-Study-August-2015.pdf>
- Clarkson, P.M., Y. Li, G.D. Richardson, & F.P. Vasari. (2008). Revisiting the relation between environmental performance and environmental disclosure: an empirical analysis. *Accounting, Organizations and Society*, 33 (4-5), 303-327.
- Dhaliwal, D., O. Li, A. Tsang, & Y. Yang. (2011). Voluntary nonfinancial disclosure and the cost of equity capital: The initiation of corporate social responsibility reporting, *The Accounting Review*, 86, 59–100.

Dhaliwal, D. S., Radhakrishnan, S., Tsang, A., Yang, Y.G. (2012). Non-financial disclosure and analyst forecast accuracy: International evidence on corporate social responsibility disclosure. *The Accounting Review*, 87(3), 723-759.

Eccles, R.G., I. Ioannou, and G. Serafeim. (2014). The Impact of Corporate Sustainability on Organizational Processes and Performance. *Management Science*, 60 (11), 2835-2857.

Ernst and Young (EY) (2014). Disclosure effectiveness: what investors, company executives, and other stakeholders are saying. Accessed November 2014.
[http://www.ey.com/Publication/vwLUAssetsAL/DisclosureEffectiveness_CC0404_DialogueDinners_13November2014/\\$FILE/DisclosureEffectiveness_CC0404_DialogueDinners_13November2014.pdf](http://www.ey.com/Publication/vwLUAssetsAL/DisclosureEffectiveness_CC0404_DialogueDinners_13November2014/$FILE/DisclosureEffectiveness_CC0404_DialogueDinners_13November2014.pdf)

Ernst & Young (EY). (2017), “Is your Non-Financial Performance Revealing the True Value of Your Business to Investors? 2017”, available at:
<http://www.ey.com/gl/en/services/assurance/climate-change-and-sustainability-services/ey-nonfinancial-performance-may-influence-investors> (accessed 1 August 2017)

European Commission (EU). 2014. Disclosure of non-financial information: Europe information: Europe Council, the European Economic and Social, environmental issues. (September 29, 2014). Available at http://ec.europa.eu/internal_market/accounting/non-financial_reporting/index_en.htm

Global Reporting Initiative (GRI). 2017. Linking the GRI Standards and the European Directive on non-financial and diversity disclosure. Available at
<https://www.globalreporting.org/standards/resource-download-center/linking-gri-standards-and-european-directive-on-non-financial-and-diversity-disclosure/>

Global Reporting Initiative (GRI). (2013). G4 Exposure Draft. 2013. Frequently asked questions about the G4 Exposure Draft and the second G4 Public Comment Period. March 9, 2014. Available at: <https://www.globalreporting.org/resourcelibrary/G4-ED-PCP2-FAQs.pdf>

Global Reporting Initiative (GRI). (2016), “Sustainability Database Disclosure”, available at:
https://www.globalreporting.org/services/Communication/Sustainability_Disclosure_Database/Pages/default.aspx

Golicic, S.L., and Smith, C.D. (2013). A meta-analysis of environmentally sustainable supply chain management practices and firm performance. *Journal of Supply Chain Management*, 49 (2), 78-95.

Ho, S.S.M., and Wong, K.S. (2001). A study of the relationship between corporate governance structures and the extent of voluntary disclosure. *Journal of International Accounting, Auditing, and Taxation*, 10 (2001), 139-156.

Hong Kong Stock Exchange (HKEx). (2015), “Appendix 27 environmental, social and governance reporting guide.” Available at:
http://www.hkex.com.hk/eng/rulesreg/listrules/mbrules/documents/appendix_27.pdf
(Accessed 28 July 2015)

Hummel, K., and Schlick, C. (2016). The relationship between sustainability performance and sustainability disclosure – Reconciling voluntary disclosure theory and legitimacy theory. *Journal of Accounting and Public Policy*, 35 (5), 455-476.

Hummel, K., and Schlick, C and M. Fifka (2019). The Role of Sustainability performance and accounting assurors in sustainability assurance engagements. *Journal of Business Ethics*, Vol.154: 733-757.

INTERNATIONAL CORPORATE GOVERNANCE NETWORK. ‘ICGN Global Stewardship Code: Membership Consultation.’ 2016. Available at:
<https://www.icgn.org/sites/default/files/ICGNGlobalStewardshipPrinciples.pdf>

International Integrated Reporting Committee (IIRC). (2014), “Integrated Reporting Committee (IRC) of South Africa. PREPARING AN INTEGRATED REPORT A STARTER’S GUIDE”, available at:
<http://integratedreporting.org/resource/irc-of-south-africa-preparing-an-integrated-report/>
(accessed 10 August 2017)

International Integrated Reporting Council (IIRC) (2015), “Assurance on Integrated Reporting (IR): Overview of Feedback and Call to Action, July 2015”, available at:
<http://integratedreporting.org/wp-content/uploads/2015/07/IIRC-Assurance-Overview-July-2015.pdf> (accessed 10 August 2017)

Investor Responsibility Research Center Institute (IRRCi). 2018. Measuring Effectiveness: Roadmap to Assessing System-level and SDG Investing. March 2018. Available at
<https://irrcinstitute.org/wp-content/uploads/2018/03/FINAL-TIPP-Report-Measuring-Effectiveness-Report-2018.pdf>

International Federation of Accountants. 2016. “The 2030 Agenda for Sustainable Development: A Snapshot of the Accountancy Profession’s Contribution”, International Federation of Accountants, New York, NY. Available at <https://www.ifac.org/publications-resources/2030-agenda-sustainable-development>.

Jain, P.K., A. Jain, & Z. Rezaee. (2016). Value-relevance of corporate social performance: Evidence from Short Selling. *Journal of Management Accounting Research*, Vol. 28, No2: 29-52.

Junior, R. M., P.J. Best, & J. Cotter. (2014). Sustainability reporting and assurance: a historical analysis on a world-wide phenomenon. *Journal of Business Ethics*, 120(1): 1-11.

Khan, M., Serafeim, G., Yoon, A. (2016). Corporate sustainability: First evidence on materiality. *The Accounting Review*, 91 (6), 1697-1724.

KPMG. 2017. The Road Ahead: The KPMG Survey of Corporate Responsibility Reporting 2017. Available at <https://assets.kpmg/content/dam/kpmg/xx/pdf/2017/10/kpmg-survey-of-corporate-responsibility-reporting-2017.pdf>

Lopez, M.V., Garcia, A., Rodriguez, L. (2007). Sustainable development and corporate performance: A study based on the Dow Jones sustainability index. *Journal of Business Ethics*, 75 (3), 285-300.

Lys, T., Naughton, J., Wang, C., (2015). Signaling through corporate accountability reporting. *Journal of Accounting and Economics*, 60 (1), 56-72

Ng, A.C., & Z. Rezaee. (2015). Business sustainability performance and cost of equity capital. *Journal of Corporate Finance*, 34, 128-149.

Porter, M. E., and M. R. Kramer. "Creating Shared Value." *Harvard Business Review* 89, nos. 1-2 (January–February 2011): 62–77.

PWC (2017) SDG Reporting Challenge 2017. Exploring business communication on the Global Goals 2017. <https://www.pwc.com/gx/en/sustainability/SDG/pwc-sdg-reporting-challenge-2017-final.pdf>

Rezaee, Z. (2015). Business sustainability: Performance, Compliance, Accountability and Integrated Reporting. Greenleaf Publishing Limited, UK.

Rezaee, Z. (2016). Business sustainability research: A theoretical and integrated perspective. *Journal of Accounting literature*, 36 (2016): 48-64.

Rezaee, Z., (2017). Corporate sustainability: Theoretical and integrated strategic imperative and pragmatic approach. *The Journal of Business Inquiry*. 16, Special Issue (Issue 1), In Press.

Rezaee, Z., L. Tuo. (2017). Are the quantity and quality of sustainability disclosures associated with the innate and discretionary earnings quality? *Journal of Business Ethics*, April 2017, In Press.

SDG Index (2016). SDG Index and Dashboards, Global Report. Available at <http://www.sdgindex.org/reports/>

SDG Compass (2016). Linking the SDGs and GRI. Available at: https://www.globalreporting.org/resourcelibrary/SDG_GRI_LInkage.pdf

Securities and Exchange Commission (SEC). 2016. SEC Chair Mary Jo White, Keynote address international corporate governance network annual conference: focusing the lens of disclosure to

set the path forward on board diversity, non-GAAP, and sustainability. (March 29). Available at: <https://www.sec.gov/news/speech/chair-white-icgn-speech.html>.

Simnett, R., A. Vanstraelen, and W.F. Chua. (2009). Assurance on general purpose non-financial reports: An international comparison. *The Accounting Review*, 84(3), 937–967.

Sustainable Investment Institute (Si2) and the IRRC Insitute. 2018. State of Integrated and Sustainability Reporting 2018. Available at <https://irrcinstitute.org/wp-content/uploads/2018/11/2018-SP-500-Integrated-Reporting-FINAL-November-2018.pdf>

Sustainability Accounting Standards Board (SASB). 2013. US SASB publishes exposure drafts on health care sector sustainability reporting. <http://www.iasplus.com/en/othernews/united-states/2013/sasb-health-care-ed>

Unruh, G., D. Kirin, N. Kruschwitz, M. Reeves, H. Rubel, and A. Meyer Zum Felde. 2016. Investing for a sustainable future. MIT Sloan Management Review. (March 29). Available at <http://sloanreview.mit.edu/projects/investing-for-a-sustainable-future/>.

UNITED NATIONS (UN) PRINCIPLES FOR RESPONSIBLE INVESTMENT: A Practical Guide to ESG Integration for Equity Investment. 2016. Available at: https://www.unpri.org/download_report/22600

UN Sustainable Development Goals report (UNSDGs). (2015), “Indicators and a Monitoring Framework for the Sustainable Development Goals Launching a data revolution for the SDGs”, available at: <http://unsdsn.org/wp-content/uploads/2015/03/150320-SDSN-Indicator-Report.pdf> (accessed 10 August 2017)

Waddock, S. A. and S. Graves. (1997). “The Corporate Social Performance–Financial Performance Link,” *Strategic Management Journal*, 19, 303-317.

Wallage, P. 2000. Assurance on sustainability reporting: An Auditor’s view. *Auditing: A Journal of Practice and Theory*, 19, supplement 2000, 53-65.

Williams, C. A., and Fisch, J. E., 2018. A request for rulemaking on environmental, social, and governance (ESG) disclosure, October 1, 2018. Available at <https://www.sec.gov/rules/petitions/2018/petn4-730.pdf>

Zhang, G. (2001). Private information production, public disclosure, and the cost of capital: Theory and implications. *Contemporary Accounting Research*, 18 (3), 363-384.

Appendix

Variables, Definitions and Data Source

Variables	Definitions	Data Sources
<i>Dependent Variables:</i>		
<i>SRQ1</i>	SRQ1 = Sustainability Reporting Quantity, a dummy variable which is equal to 1, if the firm prepare the sustainability report; zero otherwise.	GRI database
<i>SRQ2</i>	SRQ2 = Sustainability Reporting Quality, the application level of GRI framework in preparing the sustainability report	GRI database
<i>SAQ1</i>	SAQ1 = Sustainability Assurance Quantity, a dummy variable which is equal to 1, if the firm prepare the sustainability assurance; zero otherwise.	GRI database
<i>SAQ2</i>	SAQ2= Sustainability Assurance Quality, a dummy variable which is equal to 1, if the firm firms' sustainability reports are assured by accounting firms; zero otherwise.	GRI database
<i>Explanatory Variables:</i>		
<i>DJSI</i>	An indicator variable that equals 1 if a firm is included in the Dow Jones Sustainability Index (DJSI) in a given year and 0 otherwise.	Datastream / Eikon
<i>ESG</i>	ESGScore = Thomson Reuters ESG Score – measures company's ESG performance based on reported data in the public domain. The ESG sustainability disclosure component scores range from 0.1 for companies that disclose the minimum amount of ESG data to 100 for those that disclose every data variable collected by Thomson Reuters.	Thomson Reuters
<i>SDG 4</i>	<p>QUALITY EDUCATION = a measure of social dimension based on</p> <ol style="list-style-type: none"> Expected years of schooling (years) UNESCO (2016) Literacy rate of 15-24-year-old, both sexes (%)2001-2013 UNESCO (2016) Net primary school enrolment rate (%)1997-2014 UNESCO (2016) Population aged 25-64 with tertiary education (%) (a) - 2011 OECD (2016) PISA score (0-600) 2012 OECD (2016) Population aged 25-64 with upper secondary and postsecondary non-tertiary educational attainment (%) 2011-2013 OECD (2016) 	SDG index (2016)

SDG 5	GENDER EQUALITY = a measure of social dimension based on	SDG index (2016)
	<ul style="list-style-type: none"> a. Proportion of seats held by women in national parliaments (%) 2012-2014 IPU (2015) b. Female years of schooling of population aged 25 and above (% male) - 2014 UNDP (2015) c. Female labor force participation rate (% male) - 2010-2014 ILO (2016) d. Estimated demand for contraception that is unmet (% of women married or in union, ages 15-49) 2015 WHO (2016) e. Gender wage gap (% of male median wage) - 2012 OECD (2016) 	
SDG 12	RESPONSIBLE CONSUMPTION AND PRODUCTION = a measure of environmental dimension based on	SDG index (2016)
	<ul style="list-style-type: none"> a. Percentage of anthropogenic wastewater that receives treatment (%) 2012 OECD (2016) b. Municipal solid waste (kg/year/capita) - 2012 World Bank (2016) c. Non-recycled municipal solid waste (kg/person/year) (a) ○ 2009-2013 OECD (2016) 	
SDG 13	CLIMATE CHANGE = a measure of Environmental dimension based on	SDG index (2016)
	<ul style="list-style-type: none"> a. Energy-related CO2 emissions per capita (tCO2/capita) - 2011 World Bank (2016) b. Climate Change Vulnerability Monitor (0-1) - 2014 HCSS (2014) 	
SDG 15	LIFE ON LAND = a measure of social dimension based on	SDG index (2016)
	<ul style="list-style-type: none"> a. Red List Index of species survival (0-1) 2016 b. IUCN and BirdLife International (2016) c. Annual change in forest area (%) 2012 YCELP & CIESIN (2014) d. Terrestrial sites of biodiversity importance that are complete protected (%) 2013 e. BirdLife International, IUCN & UNEP-WCMC (2016) 	
SDG 16	PEACE AND JUSTICE = a measure of Social dimension based on	SDG index (2016)
	<ul style="list-style-type: none"> a. Homicides (per 100,000 people) 2008-2012 UNODC (2016) b. Prison population (per 100,000 people) - 2002-2013 ICPR (2014) c. Proportion of the population who feel safe walking alone d. at night in the city or area where they live. (%) 2006-2015 Gallup (2015) e. Corruption Perception Index (0-100) - 2014 f. Transparency International (2015) 	

- g. Proportion of children under 5 years of age whose births
- h. have been registered with a civil authority, by age (%) 2014 UNICEF (2013)
- i. Government efficiency (1-7) - 2015/2016 WEF (2015)
- j. Property rights (1-7) - 2014/2015 WEF (2015)

SDG 17

PARTNERSHIPS FOR THE GOALS = a measure of Social dimension based on high-income and all OECD DAC countries:

SDG index (2016)

- d. International concessional public finance, including
- e. official development assistance (% of GNI) 2013 OECD (2016)
- f. For all other countries: Tax revenue (% of GDP) 2013 World Bank (2016)
- g. Health, education and R&D spending (% of GDP) - 2005-2014 UNDP (2015)

Control

Variables:

SIZE

Total Assets= The natural logarithm of a firm's total assets.

DataStream

ROA

ROA = Return on assets (ROA) is an indicator of how profitable a company is relative to its total assets.

DataStream

TABLE 1
SUSTAINABILITY REPORTS (Quantity)

Panel A: A trend of sustainability reporting in the past 10 years (2005-16) by continental

Continen	# of Reports												# of Reports	% of Reports	X	Y
Year	2016	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005	2005-2016	2005-2016	2005-2016	2005-2016
Europe	2257	2181	2142	1859	1702	1409	1050	821	604	441	312	230	15008	37%	20	581
Asia	2283	1755	1576	1432	1233	995	671	517	394	245	152	65	11318	28%	3	2009
Latin America & the Caribbean	821	840	751	702	555	464	351	243	175	101	61	29	5093	13%	12	598
Northern America	687	702	687	639	591	477	291	214	181	115	79	59	4722	12%	8	126
Africa	272	308	342	343	342	392	116	64	59	30	31	29	2328	6%	2	1287
Oceania	206	207	197	193	174	159	123	98	75	57	42	26	1557	4%	41	44
Total	6526	5993	5695	5168	4597	3896	2602	1957	1488	989	677	438	40026	100%	86	4645

X= Reports Base on Pop per Million, Y=Reports Base on GDP per Capita.

Panel B: A trend of sustainability reporting in the past 10 years (2005-2016) by top Ten Industries

	INDUSTRY	2016	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005	QUANTITY	PERCENTAGE
1	Financial Services	844	759	706	646	529	476	327	238	199	140	96	66	5026	13%
2	Energy	410	391	366	342	287	253	180	136	119	80	44	30	2638	7%
3	Food and Beverage	396	382	341	301	286	237	155	109	82	53	35	25	2402	6%
4	Energy Utilities	208	202	212	214	198	180	143	116	96	67	43	22	1701	4%
5	Mining	210	193	201	208	197	174	119	82	63	40	32	22	1541	4%
6	Chemicals	259	249	201	182	165	143	92	67	52	32	26	20	1488	4%
7	Telecommunications	193	162	169	157	147	135	90	78	60	43	35	25	1294	3%
8	Construction	200	174	181	162	159	125	89	61	54	36	26	10	1277	3%
9	Real Estate	224	207	196	161	153	114	62	47	23	10	5	2	1204	3%
10	Technology	205	190	176	147	128	101	73	56	38	28	18	15	1175	3%

TABLE 2
Quality of Sustainability Reports

TYPE OF ASSURANCE	2016	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005	QUANTITY	PERCENTAGE
In accordance - Core	2551	1914	807	47	1	0	0	0	0	0	0	0	5320	21%
Undeclared	566	713	722	631	483	428	476	425	393	173	55	11	5076	20%
A+	0	152	451	642	582	502	394	309	221	125	23	1	3402	13%
B	0	181	468	665	585	469	343	237	153	94	9	0	3204	13%
C	0	190	367	540	552	517	407	295	182	76	10	0	3136	12%
B+	0	104	301	428	354	291	211	154	124	71	5	0	2043	8%
A	0	59	147	221	203	202	169	134	89	48	9	0	1281	5%
In accordance - Comprehensive	429	334	181	8	0	0	0	0	0	0	0	0	952	4%
C+	0	45	92	136	156	132	109	71	29	28	5	0	803	3%
TOTAL	3546	3692	3536	3318	2916	2541	2109	1625	1191	615	116	12	25217	100%

Type of sustainability reporting in compliance with G4 from 2005-2016, in terms of GRI G4 classifications

TABLE 3**SUSTAINABILITY ASSURANCE**

Panel A: A trend of sustainability assurance (quantity) in the past 5 years (2012-16), since 2012 using G4 using a scoring system

Continent	2016	2015	2014	2013	2012	# of Reports	% of Reports	% of Assurance Statements per Sus Reports
Europe	593	624	654	606	565	3042	42%	30%
Asia	572	512	431	368	279	2162	30%	26%
Latin America & the Caribbean	192	216	198	196	155	957	14%	26%
Northern America	114	94	99	102	87	496	7%	15%
Oceania	42	44	57	58	66	267	4%	17%
Africa	42	57	53	43	58	253	4%	26%
Total	1555	1547	1492	1373	1210	7177	100%	

Panel B: Type of sustainability assurance (quality) in terms of positive/negative, reasonable/limited assurance since 2012 using G4 using a scoring system

TYPE OF ASSURANCE	2016	2015	2014	2013	2012	QUANTITY	PERCENTAGE
Limited/ Moderate	1201	783	729	695	689	4097	57%
Not specified	152	624	597	522	345	2244	31%
Reasonable/ High	156	101	125	125	147	654	9%
Combination	42	39	41	31	29	182	3%
Total	1555	1547	1492	1373	1210	7177	100%

TABLE 4**Panel A: Descriptive Statistics for OLS Regression Sample**

<i>variable</i>	<i>Mean</i>	<i>Std Dev</i>	<i>25 Pctl</i>	<i>Median</i>	<i>75 Pctl</i>
SRQ1	0.871	0.871	0.335	1.000	1.000
SRQ2	3.009	3.009	3.091	0.000	2.000
SAQ1	0.394	0.394	0.489	0.000	0.000
SAQ2	0.521	0.521	0.715	0.000	0.000
ESG	64.445	64.445	14.811	55.651	66.158
DJSI	0.454	0.454	0.498	0.000	0.000
SDG 4	92.239	92.239	7.123	90.132	93.110
SDG 5	72.670	72.670	10.663	64.215	74.105
SDG 6	92.413	92.413	5.238	91.516	94.300
SDG 12	54.086	54.086	10.621	50.735	55.224
SDG 13	71.293	71.293	14.488	66.015	79.177
SDG 15	57.564	57.564	11.993	44.623	58.338
SDG 16	74.385	74.385	12.635	63.521	81.112
SDG 17	58.882	58.882	14.482	50.467	55.684
TAssets	10.258	10.258	0.699	9.767	10.258
ROA	8.480	8.480	7.360	2.349	5.000
ReportPop	6	8	2	2	8
ReportsGDP	1429	853	125	2008	2008

Table 4A illustrates the descriptive statistics for OLS regression sample which includes 4675 firm-year observations between 2012 and 2016. The descriptions of all the variables contained in this table can be found in the Appendix

Panel B of Table 4: Spearman Correlations for the OLS Regression Sample

	VAR	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	SRQ1	1.000														
2	SRQ2	0.386	1.000													
3	SAQ1	0.298	0.483	1.000												
4	SAQ2	0.270	0.448	0.907	1.000											
5	ESGScore	0.128	0.121	0.204	0.183	1.000										
6	DJSI	0.028	0.031	0.052	0.056	0.206	1.000									
7	SDG 4	(0.093)	(0.192)	(0.198)	(0.202)	0.059	(0.037)	1.000								
8	SDG 5	(0.062)	0.071	(0.025)	(0.076)	0.094	(0.109)	0.534	1.000							
9	SDG 6	(0.059)	(0.141)	(0.162)	(0.171)	0.034	(0.013)	0.554	0.525	1.000						
10	SDG 12	0.088	0.100	0.193	0.154	(0.122)	(0.042)	(0.600)	(0.476)	(0.554)	1.000					
11	SDG 13	0.094	0.041	0.101	0.039	(0.079)	(0.107)	(0.180)	(0.181)	(0.237)	0.539	1.000				
12	SDG 15	0.034	(0.012)	0.070	(0.017)	0.032	(0.117)	0.234	0.201	0.192	0.190	0.515	1.000			
13	SDG 16	(0.018)	(0.166)	(0.078)	(0.087)	(0.039)	(0.024)	0.573	0.079	0.014	(0.092)	0.068	0.303	1.000		
14	SDG 17	0.108	0.129	0.112	0.035	(0.022)	(0.064)	(0.157)	0.272	0.057	0.300	0.169	0.311	(0.070)	1.000	
15	TotalAssets	0.038	0.091	0.107	0.075	0.272	0.170	0.008	(0.031)	0.023	(0.063)	0.058	0.063	(0.082)	(0.043)	1.000
16	ROA	0.026	(0.023)	0.011	0.004	0.007	(0.018)	(0.009)	0.038	0.009	0.012	0.062	0.073	(0.005)	0.045	0.013
17	ReportPop	(0.054)	0.000	(0.020)	(0.002)	0.003	0.048	0.061	0.153	0.258	(0.097)	(0.716)	(0.279)	(0.103)	0.129	(0.120)
18	ReportsGDP	0.054	(0.010)	0.116	0.066	(0.034)	(0.100)	(0.021)	(0.166)	(0.221)	0.392	0.695	0.622	0.453	0.005	0.020

Table 4B illustrates the Pearson Correlations for OLS regression sample which includes 4675 firm-year observations between 2012 and 2016. The descriptions of all the variables contained in this table can be found in the Appendix. Numbers in bold indicate that the correlation is statistically different from zero with a p-value less than 10%.

Table 5
The OLS Regression relation between SRA and SDG

	SRQ1	SRQ2	SAQ1	SAQ2
ESG Score	0.00349*** (9.28)	0.0242*** (7.75)	0.00701*** (15.08)	0.00907*** (13.66)
DJSI	-0.00069 (0.07)	0.106 (1.18)	0.0177 (1.27)	0.0193 (0.98)
SDG 4	-0.00345** (2.82)	-0.134*** (10.81)	-0.0160*** (8.62)	-0.0212*** (8.10)
SDG 5	0.00267*** (4.20)	0.0664*** (10.92)	0.00677*** (7.06)	0.00614*** (4.52)
SDG 6	0.000671 (0.61)	-0.0298* (2.21)	0.00669*** (3.31)	-0.00999*** (3.52)
SDG 12	-0.00190* (2.29)	0.00335 (0.44)	0.00562*** (4.74)	0.00590*** (3.44)
SDG 13	0.00244*** (4.94)	-0.00368 (0.88)	-0.000795 (1.21)	-0.00201* (2.09)
SDG 15	-0.00120* (2.37)	0.0131* (2.18)	0.00331*** (3.62)	0.00164 (1.25)
SDG 16	0.00125* (2.48)	0.00935 (1.74)	0.00226** (2.79)	0.00278* (2.41)
SDG 17	0.00346*** (7.03)	-0.00629 (1.62)	-0.000635 (1.02)	-0.00226** (2.59)
Total Assets	-0.000849 (0.11)	0.318*** (4.99)	0.0354*** (3.55)	0.0266 (1.9)
ROA	8.22 (1.59)	-1.39** (2.96)	-1.45 (0.15)	-7.86 (0.06)
ReportsPop	0.000858 (0.7)	0.0480*** (4.36)	0.00963*** (5.27)	0.0113*** (4.28)
ReportsGDP	1.2106 (0.09)	0.000402** (3.1)	0.000128*** (6.4)	0.000168*** (6.12)
Constant	0.825*** (4.47)	15.62*** (7.95)	1.196*** (4.16)	2.369*** (5.59)
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Observations	4390	4390	4390	4390
R-square	0.0482	0.1198	0.1343	0.1198

Table 5 reports logistic regression estimates of the relation between SAR determinants and SAR consequences. ***, **, * indicate that a difference or a coefficient is significant at the 1%, 5%, and 10% levels, respectively. All variables are defined in Appendix.

Table 6
The OLS Regression relation between SRA and Region

	SRQ1	SRQ2	SAQ1	SAQ2
Asia	-0.00448 (0.21)	-0.587** (2.96)	-0.0552 (1.76)	0.0144 (0.31)
Europe	-0.0634** (2.98)	0.625** (3.21)	-0.00144 (0.05)	-0.0604 (1.33)
Latin America	0.0207 (0.72)	1.338*** (5.08)	0.0604 (1.45)	0.027 (0.44)
Northern America	0.0888*** (3.97)	-0.0434 (0.21)	0.238*** (7.38)	0.253*** (5.30)
Oceania	-0.130*** (4.63)	-0.149 (0.58)	-0.0887* (2.19)	-0.0912 (1.52)
_cons	0.919*** (46.67)	2.898*** (16.09)	0.460*** (16.17)	0.593*** (14.12)
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Observations	4675	4675	4675	4675
R-square	0.0152	0.0330	0.0361	0.0187

Table 6 reports logistic regression estimates of the relation between SAR determinants and Region. ***, **, * indicate that a difference or a coefficient is significant at the 1%, 5%, and 10% levels, respectively. All variables are defined in Appendix

Table 7
The OLS Regression relation between SRA and Industries

	SRQ1	SRQ2	SAQ1	SAQ2
<i>Consumer Staples</i>	0.0753** (3.25)	-0.0041 (0.02)	-0.0117 (0.39)	-0.0537 (1.22)
<i>Energy</i>	0.135*** (6.37)	1.036*** (4.84)	0.129*** (3.81)	0.0924 (1.93)
<i>Financials</i>	0.0508* (2.37)	0.561** (3.28)	0.140*** (5.11)	0.135*** (3.33)
<i>Health Care</i>	0.0367 (1.27)	0.107 (0.48)	-0.0794* (2.35)	-0.1 (1.90)
<i>Industrials</i>	0.0718*** (3.66)	0.363* (2.33)	0.0136 (0.55)	-0.0039 (0.11)
<i>Information Technology</i>	0.0911*** (3.93)	0.594** (2.87)	0.052 (1.61)	0.071 (1.43)
<i>Materials</i>	0.0775*** (3.84)	1.013*** (6)	0.150*** (5.67)	0.155*** (3.89)
<i>Real Estate</i>	0.0555* (2.1)	0.430* (2.15)	0.0138 (0.41)	0.0428 (0.79)
<i>Telecommunication</i>	0.140*** (5.77)	1.463*** (5.55)	0.296*** (7.07)	0.305*** (5.09)
<i>Utilities</i>	0.127*** (5.78)	1.569*** (6.85)	0.180*** (5.18)	0.207*** (4)
<i>Constant</i>	0.802*** (49.80)	2.437*** (20.74)	0.322*** (17.07)	0.454*** 15.57
<i>Year Fixed Effects</i>	Yes	Yes	Yes	Yes
<i>Industry Fixed Effects</i>	Yes	Yes	Yes	Yes
<i>Observations</i>	4675	4675	4675	4675
<i>R-square</i>	0.0126	0.0228	0.0306	0.0175

Table 7 reports logistic regression estimates of the relation between SAR determinants and industries. ***, **, * indicate that a difference or a coefficient is significant at the 1%, 5%, and 10% levels, respectively. All variables are defined in Appendix.